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10/817,565	04/02/2004	David Peter DeCenzo	STL11875	3799

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EXAMINER	
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ART UNIT	PAPER NUMBER
2114	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/817,565	DECENZO ET AL.	
	Examiner	Art Unit	
	Gabriel L. Chu	2114	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20051116*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Special Examination Procedures

1. According to MPEP 708.02 VIII (C), under special examining procedure of VIII, "Any amendment which would require broadening the search field will be treated as an improper reply." Further, see MPEP 708.02 VIII, under special examining procedure of VIII, wherein "The examiner's search will be restricted to the subject matter encompassed by the claims."

2. Therefore, **any amendment that broadens the claimed subject matter beyond Examiner's search will be treated as non-responsive.**

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. **Claims 30-34, 36-42, 44-46, 53-56, 58 rejected under 35 U.S.C. 102(b) as being anticipated by US 2003/0041201 to Rauscher.** Referring to claim 30, Rauscher discloses an apparatus comprising a plurality of data storage devices (Figure 1, 310-

380, 410-480, 510-580.) and redundant storage controllers (Figure 1, 100, 200. From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively.") within a common enclosure (Paragraph 69, "A rack 700 is used to support the chassis of the RAID system. The rack 700 comprises the left vertical end 715, and right vertical end 705, which are connected by horizontal shelves 710, 720, 730, 740, 750, and 760. The storage array controller chassis 100 rests on shelf 710, and storage array controller chassis 200 rests on shelf 720. DASD chassis 300 rests on shelf 730, DASD chassis 400 rests on shelf 740, DASD chassis 500 rests on shelf 750, and DASD chassis 600 rests on shelf 760. The connectors associated with the RAID system are not shown in FIG. 3."), the storage controllers each selectively connectable to each of the plurality of data storage devices via a switchable fabric for controlling data transfer operations in relation to each of the data storage devices (Figure 1, 110-130, 210-230. Applicants should further note Applicant's own definition for "fabric" (with emphasis), "The fabric **may comprise any device** or devices capable of configurably interconnecting data storage devices to **one or more** controllers and **may comprise** multiplexers, cross point switches, port bypass controllers. Fabrics **may also** provide translation or conversion of one bus or interface format to another format.").

5. Referring to claim 31, 39, Rauscher discloses an interface controller within the enclosure configured for interfacing with an external device (From paragraph 41, "This

RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively.").

6. Referring to claim 32, 40, Rauscher discloses redundant interface controllers configured for interfacing with the external device (Paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively.").

7. Referring to claim 33, 41, Rauscher discloses the switchable fabric is configured for switching by the storage controllers (From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively." From the abstract, "A RAID system which functions despite any single point of failure is disclosed.").

8. Referring to claim 34, 42, Rauscher discloses the switchable fabric is configured for switching by the interface controllers (From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225,

respectively." From the abstract, "A RAID system which functions despite any single point of failure is disclosed.").

9. Referring to claim 36, 45, Rauscher discloses the storage controllers are each connectable to each of the plurality of storage devices via redundant switchable fabrics for controlling data transfer operations in relation to each of the data storage devices (Figure 1. Paragraphs 45-51.).

10. Referring to claim 37, 46, Rauscher discloses each of the data storage devices is dual ported, with a port of each data storage device connected to each of the switchable fabrics (Figure 1. From paragraph 47, "The DASD are dual ported, with each DASD electrically connected to two controllers.").

11. Referring to claim 38, Rauscher discloses a multiple disc assembly comprising a plurality of data storage devices (Figure 1, 310-380, 410-480, 510-580.) and a storage controller that is selectively connectable to each of the plurality of data storage devices (Figure 1, 100, 200. From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively.") via a switchable fabric defining at least two independent signal paths between the storage controller and each data storage device for controlling data transfers in relation to each of the data storage devices (Figure 1, 110-130, 210-230.).

12. Referring to claim 44, Rauscher discloses redundant storage controllers (), each selectively connectable to each of the plurality of data storage devices via at least two

independent signal paths defined by the switchable fabric (From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively." From the abstract, "A RAID system which functions despite any single point of failure is disclosed." Figure 1. From paragraph 47, "The DASD are dual ported, with each DASD electrically connected to two controllers." Figure 1, 110-130, 210-230.).

13. Referring to claim 53, Rauscher discloses a multiple disc assembly comprising a storage array and means for controlling the array by providing multipath redundant access to storage locations of the array (Figure 1).

14. Referring to claim 54, Rauscher discloses a multiple disc assembly comprising a plurality of data storage locations that are accessible to an external device through a common connector via circuitry that defines at least two independent signal paths (Figure 1).

15. Referring to claim 55, Rauscher discloses a multiple disc assembly comprising a plurality of data storage locations that are accessible to an external device through a common connector via circuitry that comprises a switchable fabric (Figure 1).

16. Referring to claim 56, Rauscher discloses a multiple disc assembly comprising a plurality of dual ported data storage devices with a first port connected to a first switchable fabric and a second port connected to a second switchable fabric (Figure 1).

17. Referring to claim 58, Rauscher discloses a storage controller selectively connectable to each of a plurality of self-contained data storage devices via a

switchable fabric (Figure 1); and instructions stored in memory and executable by the storage controller for switching the fabric (From line 4 of column 3, "The fabric may comprise any device or devices capable of configurably interconnecting data storage devices to one or more controllers and may comprise multiplexers, cross point switches, port bypass controllers. Fabrics may also provide translation or conversion of one bus or interface format to another format.").

18. **Claims 38, 39, 41, 47-49, 53-56, 58, 59 rejected under 35 U.S.C. 102(e) as being anticipated by US 2004/0139260 to Steinmetz et al.** Referring to claim 38, Steinmetz discloses a multiple disc assembly comprising a plurality of data storage devices and a storage controller that is selectively connectable to each of the plurality of data storage devices via a switchable fabric defining at least two independent signal paths between the storage controller and each data storage device for controlling data transfers in relation to each of the data storage devices (Figure 10.).

19. Referring to claim 39, Steinmetz discloses an interface controller within the enclosure configured for interfacing with an external device (Figure 10.).

20. Referring to claim 41, Steinmetz discloses the switchable fabric is configured for switching by the storage controller (Figure 10, "RAID CONTROLLER". From paragraph 93, "The disk-array controller 1006, in turn, interfaces to the storage shelf 1010 through an interface provided by the storage-shelf routers 1014 and 1018. The disk-array controller 1006 transmits FC exchanges to, and receives FC exchanges from, what appear to be discrete FC-compatible disk drives via the FCP protocol. However, transparently to the disk-array controller, the disk-shelf routers 1014 and 1018 translate

FC commands into ATA commands in order to exchange commands and data with the SATA disk drives.").

21. Referring to claim 47, Steinmetz discloses forming a multiple disc assembly by connecting each of a plurality of data storage devices to a switchable fabric (Figure 10.); determining whether all the data storage devices are accessible via the fabric; and configuring the fabric to isolate any inaccessible data storage devices (From paragraph 90, "Third, it is far easier to identify and isolate failures within a storage shelf employing the storage-shelf router. In a traditional, one-disk-drive-per-FC-arbitrated-loop-node implementation, a failed FC port or FC link may be extremely difficult to identify, and may be difficult to isolate, under certain failure modes, while, by contrast, problems associated with the disk drives interconnected through point-to-point links to a storage-shelf router are relatively easily identified, and failed ports or links are easily isolated.").

22. Referring to claim 48, Steinmetz discloses the forming step comprises connecting each of the plurality of data storage devices to each of redundant switchable fabrics (From paragraph 92, "Each storage-shelf router 1014 and 1018 is interconnected with each SATA disk drive via point-to-point serial links, such as serial link 1028.").

23. Referring to claim 49, Steinmetz discloses the determining step comprises determining whether all the data storage devices are accessible via a first of the fabrics, and determining whether all the data storage devices are accessible via a second of the fabrics (From paragraph 93, "Moreover, there is a two-fold redundancy in storage-shelf routers. If any single link, or one storage-shelf router, fails, the remaining links and

remaining storage-shelf router can assume the workload previously assumed by the failed link or failed storage-shelf router to maintain full connectivity between the disk-array controller 1006 and each of the sixteen SATA disk drives within the storage shelf 1010.").

24. Referring to claim 53, Steinmetz discloses a multiple disc assembly comprising a storage array and means for controlling the array by providing multipath redundant access to storage locations of the array (Figure 10).

25. Referring to claim 54, Steinmetz discloses a multiple disc assembly comprising a plurality of data storage locations that are accessible to an external device through a common connector via circuitry that defines at least two independent signal paths (Figure 10).

26. Referring to claim 55, Steinmetz discloses a multiple disc assembly comprising a plurality of data storage locations that are accessible to an external device through a common connector via circuitry that comprises a switchable fabric (Figure 10).

27. Referring to claim 56, Steinmetz discloses a multiple disc assembly comprising a plurality of dual ported data storage devices with a first port connected to a first switchable fabric and a second port connected to a second switchable fabric (Figure 10).

28. Referring to claim 58, Steinmetz discloses a storage controller selectively connectable to each of a plurality of self-contained data storage devices via a switchable fabric (Figure 10); and instructions stored in memory and executable by the storage controller for switching the fabric (Figure 10, "RAID CONTROLLER". From

paragraph 93, "The disk-array controller 1006, in turn, interfaces to the storage shelf 1010 through an interface provided by the storage-shelf routers 1014 and 1018. The disk-array controller 1006 transmits FC exchanges to, and receives FC exchanges from, what appear to be discrete FC-compatible disk drives via the FCP protocol. However, transparently to the disk-array controller, the disk-shelf routers 1014 and 1018 translate FC commands into ATA commands in order to exchange commands and data with the SATA disk drives.").

29. Referring to claim 59, Steinmetz discloses a storage controller in a data transfer relationship with each of a plurality of data storage devices (Figure 10); and an isolation routine carrying out steps for determining an inaccessibility of a data storage device in the plurality (From paragraph 90, "Third, it is far easier to identify and isolate failures within a storage shelf employing the storage-shelf router. In a traditional, one-disk-drive-per-FC-arbitrated-loop-node implementation, a failed FC port or FC link may be extremely difficult to identify, and may be difficult to isolate, under certain failure modes, while, by contrast, problems associated with the disk drives interconnected through point-to-point links to a storage-shelf router are relatively easily identified, and failed ports or links are easily isolated.").

Claim Rejections - 35 USC § 103

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

31. **Claims 35, 43 rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0041201 to Rauscher as applied to claim 31, 39 above, and further in view of US 6598106 to Grieshaber et al.** Referring to claim 35, 43, Rauscher discloses the switchable fabric is configured for switching (From paragraph 41, "This RAID system comprises two storage array controllers 175 and 275, and three racks of DASD or storage units 310-380, 410-480, and 510-580. A host computer is electrically connected to the storage array controllers 175 and 275 by connectors 125 and 225, respectively." From the abstract, "A RAID system which functions despite any single point of failure is disclosed.").

Although Rauscher does not specifically disclose this switching is by the external device, host initiated failure response is known in the art. An example of this is shown by Grieshaber, from line 41 of column 8, "In one preferred embodiment of the present invention, a host detects errors on external SCSI bus 510, and in response, generates isolation requests to various connected internal buses." A person of ordinary skill in the art at the time of the invention would have been motivated to use a host because, from Grieshaber, "Clearly, an important aspect of the present invention is for the enclosure to respond appropriately when faced with a bus failure." And further, Rauscher is

interested in robust system operation, from the abstract, "A RAID system which functions despite any single point of failure is disclosed."

32. **Claims 50-52, 57 rejected under 35 U.S.C. 103(a) as being unpatentable over US 2004/0139260 to Steinmetz et al. as applied to claim 49 above, in further view of US 5898828 to Pignolet et al.** Referring to claim 50, Steinmetz discloses multi-level redundancy and determination of accessibility (From paragraph 93, "As shown in FIG. 10, there is at least two-fold redundancy in each of the intercommunications pathways within the disk array containing the disk-array controller 1006 and the storage shelf 1010. Moreover, there is a two-fold redundancy in storage-shelf routers. If any single link, or one storage-shelf router, fails, the remaining links and remaining storage-shelf router can assume the workload previously assumed by the failed link or failed storage-shelf router to maintain full connectivity between the disk-array controller 1006 and each of the sixteen SATA disk drives within the storage shelf 1010. The disk-array controller may additionally implement any of a number of different high-availability data-storage schemes, such as the various levels of RAID storage technologies, to enable recovery and full operation despite the failure of one or more of the SATA disk drives. The RAID technologies may, for example, separately and fully redundantly restore two or more complete copies of stored data on two or more disk drives. The servers intercommunicate with the disk-array comprising the disk-array controller 1006 and one or more storage shelves, such as storage shelf 1010, through a communications medium, such as an FC fabric, with built-in redundancy and failover.").

Although Steinmetz does not specifically disclose redundant storage controllers

to the first and second fabrics via first and second fabric busses, respectively, determining whether the first fabric is accessible via each of the first and second fabric busses, and determining whether the second fabric is accessible via each of the first and second fabric busses, redundant controllers with accessible and redundant interconnections are known in the art. An example of this is shown by Pignolet, from figure 5, and further, from line 39 of column 5, "For redundancy, each of the channel adapters 56, 57 and disk adapters 58, 59 are interconnected to the cache memory by dual busses 61, 62." And from line 65 of column 5, "Therefore, the storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails." A person of ordinary skill in the art at the time of the invention would have been motivated to use redundant controllers because, from Pignolet, "the storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails." And further, clearly Steinmetz is concerned with redundancy of operation.

33. Referring to claim 51, Steinmetz in view of Pignolet discloses the forming step comprises connecting redundant interface controllers to the storage controllers via first and second interface busses, respectively, determining whether a first of the storage controllers is accessible via each of the first and second interface busses, and determining whether a second of the storage controllers is accessible via each of the first and second interface busses (From figure 5 of Pignolet, 56, 57, 61, 62, further, from line 39 of column 5, "For redundancy, each of the channel adapters 56, 57 and disk adapters 58, 59 are interconnected to the cache memory by dual busses 61, 62." And

from line 65 of column 5, "Therefore, the storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails.").

34. Referring to claim 52, Steinmetz in view of Pignolet discloses the forming step comprises connecting a common system interface to the interface controllers via first and second system busses, respectively, determining whether a first of the interface controllers is accessible via each of the first and second system busses, and determining whether a second of the interface controllers is accessible via each of the first and second system busses (From figure 5 of Pignolet, 53, 54, 56, 57, and their interconnection, further, from line 39 of column 5, "For redundancy, each of the channel adapters 56, 57 and disk adapters 58, 59 are interconnected to the cache memory by dual busses 61, 62." And from line 65 of column 5, "Therefore, the storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails.").

35. Referring to claim 57, Steinmetz discloses a multiple disc assembly comprising a dual ported storage controller with a first port connected to a first switchable fabric and a second port connected to a second switchable fabric, the fabrics, in turn, connected to a plurality of data storage devices (Figure 10).

Although Steinmetz does not specifically disclose a plurality of storage controllers, redundant controllers are well known in the art. An example of this is shown by Pignolet, from figure 5, and further, from line 39 of column 5, "For redundancy, each of the channel adapters 56, 57 and disk adapters 58, 59 are interconnected to the cache memory by dual busses 61, 62." And from line 65 of column 5, "Therefore, the

storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails." A person of ordinary skill in the art at the time of the invention would have been motivated to use redundant controllers because, from Pignolet, "the storage subsystem can continue to operate when either a single disk adapter fails or a single transceiver fails." And further, clearly Steinmetz is concerned with redundancy of operation.

Conclusion

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See notice of references cited.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gabriel L. Chu whose telephone number is (571) 272-3656. The examiner can normally be reached on weekdays between 8:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571) 272-3644. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gabriel L. Chu
Examiner
Art Unit 2114

gc